

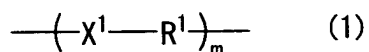
CLAIMS

1. A resin composition used as an adhesive bonding a semiconductor chip or a heat dissipating member comprising a filler (A), the following compound (B) and a thermal radical initiator (C), and substantially not containing a photo polymerization initiator:

Compound (B):

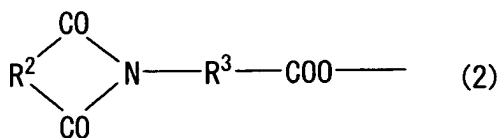
a compound containing a structure represented by the following formula (1) in a main chain and having at least one functional group represented by the following formula (2):

Formula (1):



wherein X^1 is ---O--- , ---COO--- or ---OCOO--- ; R^1 is a hydrocarbon group having 1 to 6 carbons; "m" is an integer of 1 or more and 50 or less; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other;

Formula (2):



wherein R^2 is $\text{---C}_2\text{H}_2\text{---}$ or $\text{---C}_3\text{H}_4\text{---}$; R^3 is a hydrocarbon group having

1 to 11 carbons; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other.

2. A resin composition according to Claim 1, wherein the filler (A) is silver powder.

3. A resin composition according to Claim 1 or 2, wherein X^1 of the compound (B) is -O-.

4. A resin composition according to any of Claims 1 to 3, wherein R^1 of the compound (B) is a hydrocarbon group having 3 to 6 carbons.

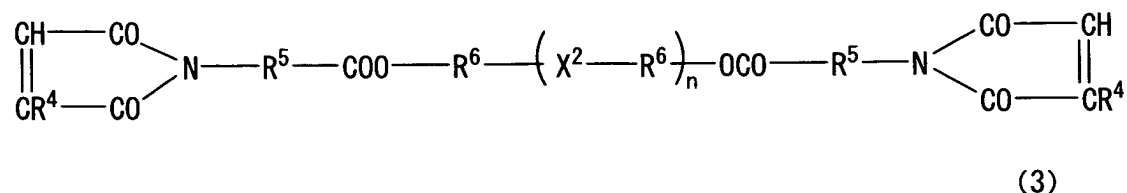
5. A resin composition according to Claim 4, wherein R^1 of the compound (B) is at least one selected from the group consisting of $-C_3H_6-$ and $-C_4H_8-$.

6. A resin composition according to any of Claims 1 to 5, wherein R^2 is $-C_2H_2-$ and R^3 is $-CH_2-$ in the compound (B).

7. A resin composition according to any of Claims 1 to 6, wherein the compound (B) has two functional groups represented by the formula (2).

8. A resin composition according to any of Claims 1 to 7, wherein the compound (B) is a bismaleimide compound (B') represented by the following formula (3):

Formula (3):



wherein X^2 is $-\text{O}-$, $-\text{COO}-$ or $-\text{OCOO}-$; each R^4 is hydrogen atom or a methyl group; each R^5 is a hydrocarbon group having 1 to 11 carbons; each R^6 is a hydrocarbon group having 3 to 6 carbons; "n" is an integer of 1 or more and 50 or less; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other.

9. A resin composition according to Claim 8, wherein X^2 of the bismaleimide compound (B') represented by the formula (3) is $-\text{O}-$.

10. A resin composition according to Claim 8 or 9, wherein R^5 of the bismaleimide compound (B') represented by the formula (3) is a hydrocarbon group not containing an aromatic group.

11. A resin composition according to any of Claims 8 to 10, wherein R^5 of the bismaleimide compound (B') represented by the formula (3) has 1 to 5 carbons.

12. A resin composition according to any of Claims 8 to 11, wherein R^5 of the bismaleimide compound (B') represented by the

formula (3) is $-\text{CH}_2-$ or $-\text{C}_5\text{H}_{10}-$.

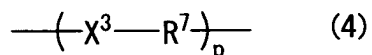
13. A resin composition according to any of Claims 8 to 12, wherein R^6 of the bismaleimide compound (B') represented by the formula (3) is at least one selected from the group consisting of $-\text{C}_3\text{H}_6-$ and $-\text{C}_4\text{H}_8-$.

14. A resin composition according to any of Claims 1 to 13, further comprising the following compound (D):

Compound (D):

a compound containing a structure represented by the formula (4) in a main chain and having at least one functional group having a polymerizable C-C unsaturated bond:

Formula (4):

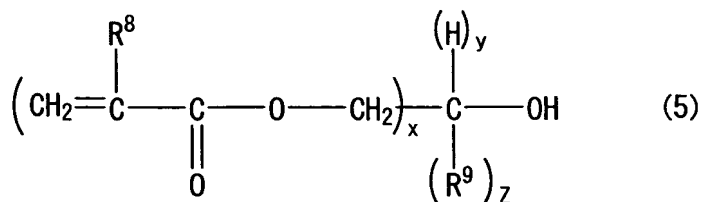


wherein X^3 is $-\text{O}-$, $-\text{COO}-$ or $-\text{OCOO}-$; R^7 is a hydrocarbon group having 3 to 6 carbons; "p" is an integer of 1 or more and 50 or less; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other.

15. A resin composition according to any of Claims 1 to 14, further containing the following acrylic ester compound (E):

Acrylic ester compound (E):

Formula (5):



wherein R^8 is hydrogen atom or a methyl group; R^9 is a hydrocarbon group having 1 to 3 carbons; "x", "y" and "z" are in the relationship expressed by $(x+y+z)=3$, $1 \leq x \leq 3$, $0 \leq y \leq 2$ and $0 \leq z \leq 2$; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other.

16. A resin composition according to Claim 15, wherein R^8 of the acrylic ester compound (E) represented by the formula (5) is a methyl group.

17. A resin composition according to Claim 15 or 16, wherein R^9 of the acrylic ester compound (E) represented by the formula (5) is a methyl group.

18. A resin composition according to Claim 16, wherein R^8 is a methyl group, R^9 is a methyl group, and $x=1$, $y=1$, and $z=1$ in the acrylic ester compound (E) represented by the formula (5).

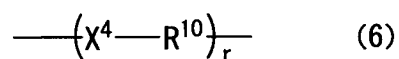
19. A resin composition according to Claim 16, wherein R^8 is a methyl group, $x=2$, $y=1$ and $z=0$ in the acrylic ester compound (E) represented by the formula (5).

20. A resin composition according to any of Claims 1 to 19, further comprising the following acrylamide compound (F):

Acrylamide compound (F):

a compound containing a structure represented by the following formula (6) in a main chain and having at least one functional group represented by the following formula (7):

Formula (6):



Formula (7):



wherein X^4 is $-\text{O}-$, $-\text{COO}-$ or $-\text{OCOO}-$; R^{10} is a hydrocarbon group having 3 to 6 carbons; R^{11} is hydrogen atom or a methyl group; "r" is an integer of 1 or more and 50 or less; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other.

21. A resin composition according to Claim 20, wherein R^{10} of the structure represented by the formula (6) of the acrylamide compound (F) is at least one selected from the group consisting of $-\text{C}_3\text{H}_6-$ and $-\text{C}_4\text{H}_8-$.

22. A resin composition according to Claim 20 or 21, wherein X^4 of the structure represented by the formula (6) of the acrylamide

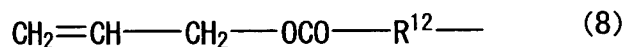
compound (F) is -O-.

23. A resin composition according to any of Claims 1 to 22, further containing the following allyl ester compound (G):

Allyl ester compound (G):

a compound having at least one functional group represented by the following formula (8):

Formula (8):

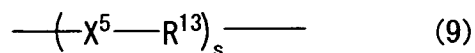


wherein R^{12} is a hydrocarbon group having 2 to 8 carbons.

24. A resin composition according to Claim 23, wherein R^{12} of the structure represented by the formula (8) of the allyl ester compound (G) does not contain an aromatic group.

25. A resin composition according to Claim 23 or 24, wherein the allyl ester compound (G) contains a structure represented by the following formula (9):

Formula (9):



wherein X^5 is -O-, -COO- or -OCOO-; R^{13} is a hydrocarbon group having 3 to 6 carbons; "s" is an integer of 1 or more and 50 or less; and if the formula contains two or more parts which are

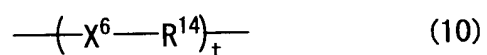
denoted by the same symbol, each of them may be the same or different from each other.

26. A resin composition according to any of Claims 1 to 25, further containing the following compound (H):

Compound (H):

a compound derived from a hydrocarbon having at least one C-C unsaturated bond in one molecule, which has a number average molecular weight of 500 to 5,000, contains a structure represented by the following formula (10) at its modified position, and has at least one functional group having a polymerizable C-C unsaturated bond:

Formula (10):



wherein X^6 is ---O--- , ---COO--- or ---OCOO--- ; R^{14} is a hydrocarbon group having 3 to 6 carbons; "t" is an integer of 1 or more and 50 or less; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other.

27. A resin composition according to Claim 26, wherein X^6 is ---O--- and R^{14} is C_4H_8 in the structure represented by the formula (10) of the compound (H).

28. A resin composition according to Claim 26 or 27, wherein

a hydrocarbon led to the compound (H) and having at least one C-C unsaturated bond in one molecule is a butadiene polymer.

29. A resin composition according to Claim 26 or 27, wherein a hydrocarbon led to the compound (H) and having at least one C-C unsaturated bond in one molecule is an isoprene polymer.

30. A resin composition according to any of Claims 26 to 29, wherein the polymerizable C-C unsaturated bond of the compound (H) is a (meth)acryloyl group.

31. A resin composition according to any of Claims 1 to 30, further containing a reactive diluent (I).

32. A resin composition according to Claim 31, wherein the reactive diluent (I) is a vinyl compound which is in liquid form at room temperature other than the compounds (D) to (H).

33. A resin composition according to Claim 32, wherein the vinyl compound is a compound containing at least one (meth)acryloyl group.

34. A resin composition according to any of Claims 1 to 33, further containing a silane-based coupling agent (J).

35. A resin composition according to Claim 34, wherein the coupling agent (J) is a silane coupling agent having an S-S bond.

36. A resin composition according to Claim 34 or 35, wherein the coupling agent (J) further contains a silane coupling agent having a glycidyl group.

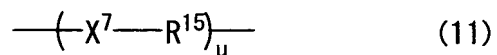
37. A resin composition according to any of Claims 1 to 36, containing a compound (K) having a glycidyl group other than the silane coupling agent having a glycidyl group.

38. A resin composition according to any of Claims 1 to 37, further containing the following compound (L) and the following compound (M):

Compound (L):

a compound containing the following structure represented by the formula (11) in a main chain and having at least one glycidyl group:

Formula (11):



wherein X^7 is $-\text{O}-$, $-\text{COO}-$ or $-\text{OCOO}-$; R^{15} is a hydrocarbon group having 3 to 6 carbons; "u" is an integer of 2 or more and 50 or less; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other;

Compound (M):

a compound having a functional group which can react with

the glycidyl group of the compound (L).

39. A compound according to Claim 38, wherein the repeating unit (X^7-R^{15}) of the compound (L) is the same as the repeating unit (X^1-R^1) of the compound (B).

40. A semiconductor device produced by using the resin composition according to any of Claims 1 to 39 as a die attach material.

41. A semiconductor device produced by using the resin composition according to any of Claims 1 to 39 as a material for bonding a heat dissipating member.